

surely not better than those obtained from simply shortening the capsule. In his first case, two years after the operation, and in his second case, three months after operation, the affected arm could be raised vertically to an angle of 160 degrees. My patient, three months after operation, could elevate the arm straight upward, or to an angle of 180 degrees. Probably all that was accomplished by suturing the muscles was to shorten them slightly and thus to impair their function. Probably, and fortunately, the sutures cut through, and the new adhesions were broken up by the active and passive movements of the after-treatment in the weeks following the operation, so that the effect of the sutures was largely overcome. When a partial dilatation of the capsule was noted, it was practically always of the anterior, internal, or axillary portion, and is readily explained by an original tear of that portion.

As a result of my study of the subject, I am led to the simple conclusion that the usual anterior, habitual, or recurrent dislocation of the shoulder is due to a traumatic, cicatricial, anterior, hernial pouch of the capsule, and that the object of the operation should be to obliterate the hernial protrusion. It would be a simple matter to remove at the same time any free or attached joint body that may be present. Joessel's teaching is based upon a misinterpretation of his specimens, and should be set aside.

The treatment of this condition will be taken up in a subsequent paper.

THE CLINICAL FORMS OF PYELONEPHRITIS.¹

BY DANIEL N. EISENDRATH, A.B., M.D.,

PROFESSOR OF SURGERY IN THE COLLEGE OF PHYSICIANS AND SURGEONS, UNIVERSITY OF ILLINOIS; ATTENDING SURGEON TO THE MICHAEL REESE AND THE COOK COUNTY HOSPITALS, CHICAGO.

It is difficult to find a correct name for the condition to be described in this paper. The term pyelonephritis is, without doubt, the proper one from a pathological standpoint for those cases which I shall speak of as the urogenous type, that is, those in which the infection extends upward from the bladder to the pelvis of the kidney. In the other variety, that is, the hematogenous type, in which the infection is carried to the kidney through the blood stream, the pelvis of the kidney is but little affected until late in the disease, so that the pathologist would term these cases septic nephritis. The clinical picture, however, of both types is so similar that it seems best for the present to retain the term pyelonephritis

¹ Read at a meeting of the Mississippi Valley Medical Association, October 14, 1908.

to include both modes of infection. Henry Morris² calls the condition to be described "acute interstitial nephritis," but this, and the term "infective nephritis," lead to so much confusion with well recognized clinical forms of nephritis that it is well to discontinue their use in this connection.

Pyelitis and pyonephrosis have been well recognized conditions for many years. The intermediate pathological condition, pyelonephritis, in which the kidney is the seat of suppuration in its earlier stages, has not received the consideration which it deserves. It has become an absolute necessity at the present time for us to be able to recognize such a pyelonephritis clinically in order to be able to treat it properly.

ETIOLOGY. The causes are most conveniently divided according to the chief modes of entry of the infection: the urogenous or ascending, and the hematogenous or descending.

1. *Urogenous Type.* (a) Cystitis is one of the most frequent sources of infection. The presence of cystitis alone would not be sufficient to explain the spread of infection along the ureter to the kidney. We know that normally the back flow of urine from the bladder into the ureter is prevented by a number of factors, chief among which is the sphincteric closure of the ureter. Israel and others have shown that in cases of enlarged prostate and stricture of the urethra, there is a diminished action of this sphincter, and the orifice becomes patulous, thus allowing the urine to back up into the ureter. Any condition, such as cystitis, which increases the normal intravesical pressure, will produce the same effect. Again, a loss of contractile power on the part of the bladder walls, such as occurs after enlarged prostate or injuries and diseases of the spinal cord, will produce the same result. (b) Any obstruction to the out-flow of urine from the kidney, whether it be in the pelvis of the kidney, ureter, bladder, or urethra, may be a factor. This urogenous cause includes calculi, strictures, tumors pressing upon the ureter, enlarged prostate, and kinks of the ureter in floating kidney. (c) Fistulæ between the ureter and other hollow viscera, such as the rectum, which will permit of the entrance of organisms into the ureter, may also serve as a cause.

2. *Hematogenous Type.* (a) Primary. This includes the cases in which the foci of infection in one or both kidneys are the only demonstrable ones. This is the form to which attention has of recent years been directed by Brewer, Cabot, and others. In some of the cases the condition has followed a trauma, and Brewer has demonstrated experimentally that an injury favors localization of the organisms; but so many cases occur without an injury that the latter cannot be regarded as a vital factor. (b) Secondary. This embraces a large class of cases in which the renal infection is preceded,

² *Surgical Diseases of the Kidney.*

(1) by one of the acute infectious diseases, such as pneumonia, typhoid fever, erysipelas, or diphtheria, etc.; (2) by a focus of suppuration elsewhere in the body, such as a furuncle, carbuncle, phlegmon, osteomyelitis, etc.; or (3) by some form of bowel infection. The latter is the most frequent source of infection in the cases of pyelonephritis in children, as shown by Heubner, Baginsky, and Abt.

PATHOLOGY. The organisms most frequently found in both the urogenous and the hematogenous types are colon bacilli, staphylococci, streptococci, gonococci, and proteus vulgaris. It is generally believed that the gonococcus simply prepares the soil for the other varieties by producing a preceding cystitis, ureteritis, or pyelitis.

The colon bacillus and the ordinary pus organisms undoubtedly play the chief role in the majority of cases, whether of hematogenous or urogenous origin. The pathological changes vary according to the source of infection and the virulence of the organism. In the urogenous or ascending type the changes characteristic of an acute or chronic pyelitis precede the renal changes. The latter differ from those found in the hematogenous type by the fact that the first evidence of infection of the renal parenchyma in the urogenous type is in the form of yellowish streaks, extending from the papillae into the medulla and cortex. In addition, one finds multiple miliary abscesses scattered through the cortex. A characteristic feature of these pyelonephritic abscesses is their frequent arrangement in groups, surrounded by zones of intense hyperemia, best seen on the surface of the kidney. Each miliary abscess is surrounded by a dark zone of intense hyperemia. Whether the abscesses occur singly or in groups, they usually project beyond the level of the surrounding cortex and become adherent to the capsule. If there is much obstruction in the pelvis, ureter, bladder, or urethra, the back pressure greatly favors the destruction of the kidney, and all stages of the process can be found from the small abscesses to transformation of the kidney into a pus sac (pyonephrosis).

The hematogenous form differs somewhat in its pathology from the urogenous. There are no preceding changes in the pelvis of the kidney, especially no yellowish streaks of purulent softening radiating from the papillae toward the cortex. The hematogenous type may appear in such a hyperacute form that only congestion and turbidity of the kidney parenchyma are found, death taking place in a few hours after the onset of symptoms. In the less acute form the changes are somewhat similar to those found in the urogenous type. Throughout the parenchyma, numerous foci of infection are found. These show all of the stages of suppuration from leukocytic infiltration to necrosis of the tissues and pus formation. As in the urogenous type, the most characteristic evidence of infection is the presence of a large number of miliary abscesses on the surface of the kidney. There is, however, not as much tendency to the group-

ing of the abscesses as in the urogenous type. In some of the hematogenous cases a single or several large abscesses have been found, instead of numerous small ones. Goodhart, in 1868, and Weir, in 1894, showed that the urogenous type very frequently involved only one kidney. Prior to that time the old term "surgical kidney" was usually interpreted as a bilateral infection of both kidneys following a cystitis, enlarged prostate, calculi, etc. Attention has of recent years been directed to the fact that in many of the cases of hematogenous infection the disease is quite often unilateral. This latter fact is very important in the diagnosis and treatment of the condition.

SYMPTOMS AND DIAGNOSIS. There is scarcely any other renal disease which presents such a variety of clinical pictures as pyelonephritis. A description of one group of symptoms would not answer for every case. It is, therefore, most convenient to divide the clinical forms of pyelonephritis, first, according to the source of infection, that is, whether it has reached the kidney through the blood stream (hematogenous) or through the medium of the ureter (urogenous). This division will suffice for quite a number of cases in which the previous history and the examination of the urine will show whether or not the bladder has been the source of infection. There are, however, an equally large number of cases in which the source of infection is not quite clear, and yet the clinical picture of a renal infection is quite evident. It is so difficult to classify the latter class of cases that it has always seemed advisable to me to place them in separate groups. The cases to which I refer are those occurring (a) in children, and (b) in the puerperium and during pregnancy. Clinically, then, such a division would be as follows:

1. Hematogenous type: (a) Hyperacute; (b) acute; (c) subacute.
2. Urogenous type: (a) Recurrent febrile; (b) continuous febrile (chronic urosepsis).
3. Pyelonephritis of children.
4. Pyelonephritis of pregnancy.
5. Pyelonephritis of the puerperium.

1. HEMATOGENOUS CLINICAL VARIETIES. For many years the view was universally held that renal infections (not including calculous pyonephrosis or renal tuberculosis) were almost always bilateral and the result of a preceding cystitis. For this reason the now obsolete term of "surgical kidney" was employed to include every clinical variety of the disease. We now know that the source of infection can be recognized from the symptoms and examination alone as being hematogenous in origin, and that in a very large proportion of cases the infection involves only one kidney, and is thus amenable to surgical intervention. Israel² was one of the first to call attention to hematogenous renal infection as a clinical entity.

² Surgery of the Kidney, 1901.

Since that time George E. Brewer, Farrar Cobb, I, and others have described the clinical picture of these cases of acute hematogenous infections of the kidney. The clinical types of the latter are:

(a) *The Hyperacute Hematogenous Form.* The clinical course is usually so rapid and the symptoms of a most virulent infection so marked that any symptoms pointing to the kidney as the source of infection are obscured by the general sepsis. The onset of symptoms is very sudden, usually in persons who have previously enjoyed good health. There is great prostration, high fever (to 106° F.), rapid pulse, marked leukocytosis, vomiting, and often general muscular pains. In some cases there is severe abdominal pain, muscular rigidity, and tenderness over the costovertebral angle. When localizing symptoms such as those just mentioned are absent, and the examination of the urine is negative, the diagnosis must be one of exclusion. The conditions which must be considered in the differential diagnosis are severe influenza, acute abdominal affections, such as perforation of gastric and duodenal ulcers, appendicitis, gallstones, mixed infection in tuberculous kidneys, malaria, and typhoid fever. Unless the appendix lies behind the cecum, or high up near the liver, the differentiation from appendicitis is not difficult. In the latter disease there is more muscular rigidity and tenderness, and pain is a far more prominent symptom. In the case of the retrocecal appendix there is tenderness and pain in the iliocostal space, but there is apt to be more muscular rigidity and spontaneous pain than in acute renal infection. In many cases examination of the urine will be of great aid in distinguishing the two conditions.

In acute cholecystitis the pain is more superficial and nearer the costal arch. Muscular rigidity is most marked in the right hypochondrium, and tenderness on palpation more marked there than in the iliocostal angle. The differentiation of the other conditions named usually presents no difficulties.

(b) *Acute or Intermediary Hematogenous Form (Brewer).* The clinical pictures in the less acute or intermediary (Brewer) hematogenous forms of infection differ but little from that of the acute urogenous type. The chief difference lies in the fact that the symptoms in the hematogenous type begin either after one of the acute infectious diseases or soon after a septic focus, such as a carbuncle, etc., has appeared in some other part of the body. In the urogenous form there is often the history of a preceding cystitis, or there are evidences of the presence of obstruction in the urinary tract, either in the form of a valve, stricture, or stone in the ureter, or of an enlarged prostate, or calculi obstructing the urethra.

In these acute cases there is the history of a sudden onset of fever, often accompanied by chills. The temperature is irregular and often persistently high, and is accompanied by all the other evidences of a severe infection. Fortunately, the localizing signs both in the acute and subacute forms are more marked than in the hyper-

acute. There is usually some tenderness over the iliocostal angle, and often muscular rigidity here.

(c) *Subacute Hematogenous Form*. In this third form of hematogenous renal infection the principal symptoms are long-continued fever of an irregular character, accompanied by unilateral costo-vertebral tenderness. Urinary findings are more constant in acute and very mild forms than in the hyperacute. Pus, blood, casts, and albumin are present in the majority of cases. The diagnosis in this mild class is made by a thorough examination so as to exclude any other source of fever taken in conjunction with the costovertebral tenderness and urinary changes.

2. **UROGENOUS CLINICAL VARIETIES:** (a) *Recurrent Febrile Urogenous Type*. The symptoms of this form are quite similar to those of the hematogenous subacute form just described. The history differs somewhat: As in the acute hematogenous form, a patient who has had a cystitis will suddenly have one or more chills, followed by high temperature and profuse sweats. This syndrome will last several days to a week, and then the temperature will become normal or slightly above normal for a variable period. A second attack of chills, fever, and sweats will occur as unexpectedly as the first, and the same cycle will repeat itself a number of times.

The diagnosis in these cases presents no difficulties if one will examine the urine for pus, blood, and casts, which are almost invariably found. The amount of pus is always larger just after the cycle just described, since it is the retention of this pus in the kidney which causes the recurrent febrile attacks.

(b) *Chronic Urogenous Pyelonephritis*. In this group of cases the renal infection is always secondary to a cystitis. The latter may be a complication of a hypertrophied prostate or a stricture of the urethra. Such mechanical obstructions to the outflow of urine are not a necessary factor in the production of a cystitis which is followed by chronic infection. Cystitis may exist in both sexes, but with especial frequency in the female, without such mechanical obstruction, and remain unimproved for months and years. In this class of chronic urogenous renal infections the clinical picture is often that of a pyelitis alone. Pathologically, however, the renal parenchyma is equally as much involved. Clinically these cases present a most varied picture. In some, fever is more or less constant. The temperature ranges from 99° to 100°, rarely higher. There is an inability to gain in weight in spite of the most careful attention to diet and general hygiene. Such patients lack color, and in some the anemia is quite noticeable. A dull aching pain in the lumbar region is quite often present. The urine contains pus in variable quantities.

An effort was made by older writers to distinguish pus coming from the kidney from that due to a cystitis by the fact that in the former case (kidney) the urine was acid and epithelial cells with

small bodies and long tails were present in the urine. These epithelial cells were said to be characteristic of the renal pelvis. In cystitis, the urine was said to be alkaline, and there was an absence of the aforementioned epithelial cells. We now know that these older views as to the source of the pyuria, although true in a measure, cannot be relied upon to distinguish pus of vesical from that of renal origin. The reaction of the urine depends upon the microorganism which causes the infection. If it is due to the colon bacillus alone, as is so frequently the case, the urine is acid, whether the bladder alone or both it and the kidney are involved. If the infection is due to the urea decomposing organisms, the reaction is alkaline. In regard to the epithelium, it is a well-recognized fact that metaplasia or change in form occurs so frequently in the bladder epithelium during a cystitis that no reliance can be placed upon any particular form as distinguishing bladder epithelium from that coming from the renal pelvis. The only positive manner in which the source of a pyuria can be determined is by a careful study of the clinical symptoms taken in conjunction with the results obtained by cystoscopic examination and ureteral catheterization.

In many of these chronic urogenous pyelonephritides there are periods in which they have higher fever and other more general signs of infection, which rapidly subside as soon as the drainage from the kidney is free again. Influenza, malaria, intestinal auto-intoxication, rheumatism, etc., are often diagnosticated in these cases, when in reality the source of the recurrent or protracted fever, etc., is in the kidney.

3. PYELONEPHRITIS DURING INFANCY AND CHILDHOOD. This form only differs from those just described by the fact that it is a frequent cause of obscure fever in infants and young children, and as such deserves special mention. In a recent paper I. A. Abt has reported 22 cases of cystopyelitis, and calls attention to the presence of persistent fever in children, accompanied by rapid pulse and progressive pallor and emaciation. The fever is frequently interpreted as due to an intestinal intoxication, and unless pyelonephritis is borne in mind as one of the causes of obscure fever during early life, the diagnosis will either not be made at all or the condition will be recognized too late to be of any benefit. The mode of infection in the majority of these cases is undoubtedly through the blood stream, and the source or atrium for the organisms to enter the circulation is in the intestine. The acute febrile form with the clinical picture of a severe sepsis ushered in by chills, high fever, etc., does not occur nearly as often in children as in adults. An examination of the urine should be made in every case of continued or remittent fever in children when no other cause can be found.

4. PYELONEPHRITIS DURING PREGNANCY. The symptoms of renal infection occurring during pregnancy differ but little from the

description of the clinical picture in males and in the non-pregnant female. The only reason for describing it separately here is to call attention to the fact that when it does occur during pregnancy the possibility of renal infection is seldom taken into consideration in making a diagnosis of the cause of either a continuous fever or of chills and fever, which occur without warning.

A recent case of mine will serve to illustrate many of the important points: During the fifth month of her pregnancy, a patient who had previously enjoyed the best of health had a chill, followed by a temperature of 105° F., accompanied by rapid pulse, great prostration, high leukocyte count, and scanty urine containing much pus. The temperature dropped to normal within a few hours, but the same cycle of chill, fever, and sweat recurred at irregular intervals during the following four days. The urine contained a few casts and some epithelial cells, which were interpreted as of renal origin. There was not more albumin than could be accounted for by the amount of pus present. I saw the patient in consultation on the fourth day of the illness. Palpation of the abdomen failed to show any localized muscular rigidity or tenderness over the right iliac region. One could make deep pressure over all parts of the abdomen, but there was no sensitiveness except upon bimanual palpation of the right kidney, and here it was only of moderate degree. Examination of the genitalia was negative. One could thus exclude appendicitis, cholecystitis, or any form of genital infection. The possibility of such a sudden onset, during pregnancy, of chills, fever, etc., even without vesical symptoms, was recalled, and after appropriate non-operative measures were instituted, the patient made a prompt recovery. Pregnancy proceeded without further incident and ended in a normal manner.

This case illustrates one of the two clinical pictures under which renal infections can occur both during pregnancy and in the puerperium. In the second form, the disease may pursue a more chronic course. There is a general feeling of malaise, accompanied by muscular pains, fatigue, and fever of varying degree. It is the persistence of this temperature which first directs attention to this second class of cases. Bladder symptoms, as in the more acute form, may be entirely absent or very slight. In the chronic form the presence of pus in the urine is a more constant finding than in the acute form, because the infection is usually the result of the ascending type, that is, from the bladder. Tenderness over the kidney or ureter is seldom sufficiently marked in these more protracted cases to be of value in making a diagnosis. When the outflow of pus from the kidney is not obstructed there is but little fever, but this recurs promptly when there is any retention. The use of the cystoscope is seldom necessary, since the diagnosis in both of the above classes of cases can be made by excluding any other source for the fever than the kidney.

In the majority of cases the pyelonephritis is upon the right side. This is due to the fact that although both ureters are compressed by the uterus during pregnancy, the right ureter is more compressed than the left, as the result of the rotation of the uterus on its long axis from left to right and the greater frequency of positions in the right oblique diameter. The most frequent abdominal conditions which begin so acutely are cholecystitis, stones in the common bile duct, and appendicitis. These can be readily excluded by the absence of localized muscular rigidity and tenderness over the respective areas, and the fact that high fever preceded by chills is only characteristic of common duct stones.

5. PYELONEPHRITIS IN THE PUERPERIUM. This, like the similar condition in pregnancy, may begin very suddenly, without prodromal symptoms like those of cystitis. In the majority of cases the source of the infection in all probability is in the bladder. In only a small number is the infection a descending (that is, a hematogenous) one. The patient may have made an excellent recovery from the parturition with normal temperature, pulse, and lochia. Then suddenly she has a chill, followed by high fever, rapid pulse, and a marked leukocytosis. The fever either persists or recurs irregularly following a chill.

In some cases there is marked pain over the affected kidney (in the lumbar region) and along the ureter. In others there are absolutely no localizing symptoms referable to the kidney. This syndrome may occur during the first few days or several weeks after parturition has occurred. Pus in a variable quantity is usually present in the urine; and in some cases there is vesical tenesmus and pain on micturition, but these two symptoms are not constant. The diagnosis in these cases must be made by excluding any of the pelvic complications following infection during or soon after parturition. If the pelvic examination yields negative results, an infection of the kidney should always be thought of as a frequent cause of fever during the puerperium. The clinical picture just described, of a sudden onset with chill, fever, etc., does not fit all cases. In some, the only symptom to attract the physician's attention is rise in temperature, especially toward evening, for which no cause can be found in the genitalia. Palpation of the kidney in both of the above types often reveals considerable tenderness, especially on bimanual palpation. The organism which causes the pyelonephritis is the colon bacillus, and the starting point is without doubt an intestinal infection, especially in those cases in which any instrumental infection of the bladder can be excluded.

THE OPERATIVE TREATMENT OF DEFLECTION OF THE NASAL SEPTUM.

BY CHARLES W. RICHARDSON, M.D.,

PROFESSOR OF RHINOLOGY AND LARYNGOLOGY IN THE GEORGE WASHINGTON UNIVERSITY,
WASHINGTON, D. C.

THE consideration of the proper operative treatment for the restoration of the deflected nasal septum is only secondary in importance to that still important question as to the justification of the operation in any individual case presenting itself for consideration. Since attention was first called to the deflection of the septum, and the possible influence that bending of the septum—obstructing one or both of the nasal chambers more or less completely—may play in the causation of certain pathological changes in the nasal cavities, the ingenuity of rhinologists has been taxed to overcome this deflection with the restoration of the septum to a normal vertical plane.

The nasal septum is a thin plate of cartilage and bone covered with mucoperichondrium and mucoperiosteum, and separates the nose into two nasal cavities. The mucoperichondrium and mucoperiosteum are very loosely attached to the bone and periosteum, except at sutural borders and where from traumatism it has formed adhesion. This structure is composed of the quadrangular cartilage, the vomer, and the perpendicular plate of the ethmoid. It should be placed in a vertical plane in the nose to be in an absolutely normal position. Through the action of various agents the septum becomes subject to alteration from the normal plane; when this change is so excessive as to obstruct one or both nasal cavities, or bring it into contact, more or less constant, with one or more of the turbinates, the condition becomes pathological. The changes in the septum may be such that there is a simple bending of the septum without any thickening; at other times the deflection is attended with increase in its later dimensions, which latter may assume the form of thickening at the point of greatest bending or the formation of a distinct ridge or spur.

ETIOLOGY. The etiological factors which produce deviation of the septum may be classified under four headings: Developmental, obstructive, traumatic, and diseases of a general or local nature.

Developmental. This factor no doubt plays quite an important role in the causation of deflection of the septum. The septal constituent parts not ossifying with equal degree of rapidity, and being in excess of the normal space allotted to them, cause, naturally, a bending of the later ossifying bone or the least resisting constituent of the group making up the septum.

Obstructive. Conditions causing obstruction to the air current through the nasal cavities impair the development of these chambers